DOCUMENT RESUME

ED 366 927 CS 011 606

AUTHOR	Guthrie, John T.; And Others
TITLE	Concept-Oriented Reading Instruction: An Integrated Curriculum To Develop Motivations and Strategies for Reading. Reading Research Report No. 10.
INSTITUTION	National Reading Research Center, Athens, GA.; National Reading Research Center, College Park, MD.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	94
CONTRACT	117A20007
NOTE	40p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Comparative Analysis; Grade 5; Instructional Effectiveness; Integrated Curriculum; Intermediate Grades; Program Effectiveness; *Reading Comprehension; *Reading Improvement; *Reading Instruction; Reading Research; *Reading Strategies
IDENTIFIERS	Education Consolidation Improvement Act Chapter 1; Prince Georges County Public Schools MD; Reading Motivation

ABSTRACT

A project designed and implemented a framework of conceptually oriented reading instruction to foster students' amount and breadth of reading, intrinsic motivations for reading, and strategies of search and comprehension. The framework emphasizes five phases of reading instruction in a content domain: observing and personalizing, searching and retrieving, comprehending and integrating, communicating to others, and interacting with peers to construct meaning. Instruction was implemented in a year-long curriculum with a multicultural population of fifth-grade students in a Chapter 1 school in Prince George's County, Maryland. Measures of learning suggested that students who had Concept-Oriented Reading Instruction (CORI) for 4 months surpassed a comparison classroom in amount and breadth of reading and intrinsic motivations for reading. The CORI students gained significantly in the cognitive strategies of search and comprehension during the 4 months. CORI instruction was contrasted to experience-based teaching and strategies instruction in terms of their support for motivational and cognitive development. (One table and six figures of data are included; 45 references are attached.) (Author/RS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 366 927

Concept-Oriented Reading Instruction: An Integrated Curriculum to Develop Motivations and Strategies for Reading

John T. Guthrie
Karen McGough

University of Maryland College Park

Lois Bennett

Calverton Elementary School
Beltsville, Maryland

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

CS011606

NRRC National Reading Research Center

READING RESEARCH REPORT NO. 10
Winter 1994

BEST COPY AVAILABLE

NRRC

National Reading Research Center

Concept-Oriented Reading Instruction: An Integrated Curriculum to Develop Motivations and Strategies for Reading

John T. Guthrie

University of Maryland at College Park

Lois Bennett

Calverton Elementary School, Beltsville, Maryland

Karen McGough

University of Maryland College Park

READING RESEARCH REPORT NO. 10

Winter 1994

The work reported herein was funded in part by the National Reading Research Center of the University of Georgia and University of Maryland. It was supported under the Educational Research and Development Centers Program (PR/AWARD NO. 117A20007) as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed here do not necessarily reflect the position or policies of the National Reading Research Center, the Office of Educational Research and Improvement, or the U.S. Department of Education.

NRRC National Reading Research Center

Executive Committee
Donna E. Alvermann, Co-Director
University of Georgia
John T. Guthrie, Co-Director
University of Maryland College Park
James F. Baumann, Associate Director
University of Georgia
Patricia S. Koskinen, Associate Director
University of Maryland College Park
JoBeth Allen
University of Georgia
John F. O'Flahavan
University of Maryland College Park
James V. Hoffman
University of Texas at Austin
Cynthia R. Hynd
University of Georgia
Robert Serpell
University of Maryland Baltimore County

Publications Editors

Research Reports and Perspectives
David Reinking, Receiving Editor
University of Georgia
Linda Baker, Tracking Editor
University of Maryland Baltimore County
Linda C. DeGroff, Tracking Editor
University of Georgia

Instructional Resources
Lee Galda, *University of Georgia*

Research Highlights
William G. Holliday
University of Maryland College Park

Policy Briefs
James V. Hoffman
University of Texas at Austin

Videos
Shawn M. Glynn, *University of Georgia*

NRRC Staff
Barbara F. Howard, Office Manager
Melissa M. Erwin, Senior Secretary
University of Georgia

Barbara A. Neitzey, Administrative Assistant
Valerie Tyra, Accountant
University of Maryland College Park

National Advisory Board
Phyllis W. Aldrich
Saratoga Warren Board of Cooperative Educational Services, Saratoga Springs, New York
Arthur N. Applebee
State University of New York, Albany
Ronald S. Brandt
Association for Supervision and Curriculum Development
Marshá T. DeLain
Delaware Department of Public Instruction
Carl A. Grant
University of Wisconsin-Madison
Walter Kintsch
University of Colorado at Boulder
Robert L. Linn
University of Colorado at Boulder
Luís C. Moll
University of Arizona
Carol M. Santa
School District No. 5
Kalispell, Montana
Anne P. Sweet
Office of Educational Research and Improvement, U.S. Department of Education
Louise Cherry Wilkinson
Rutgers University

Technical Writer and Production Editor
Susan L. Yarborough
University of Georgia

Text Formatter
Jordana E. Rich
University of Georgia

NRRC - University of Georgia
318 Aderhold
University of Georgia
Athens, Georgia 30602-7125
(706) 542-3674 Fax: (706) 542-3678
INTERNET: NRRC@uga.cc.uga.edu

NRRC - University of Maryland College Park
2102 J. M. Patterson Building
University of Maryland
College Park, Maryland 20742
(301) 405-8035 Fax: (301) 314-9625
INTERNET: NRRC@umail.umd.edu

About the National Reading Research Center

The National Reading Research Center (NRRC) is funded by the Office of Educational Research and Improvement of the U.S. Department of Education to conduct research on reading and reading instruction. The NRRC is operated by a consortium of the University of Georgia and the University of Maryland College Park in collaboration with researchers at several institutions nationwide.

The NRRC's mission is to discover and document those conditions in homes, schools, and communities that encourage children to become skilled, enthusiastic, lifelong readers. NRRC researchers are committed to advancing the development of instructional programs sensitive to the cognitive, sociocultural, and motivational factors that affect children's success in reading. NRRC researchers from a variety of disciplines conduct studies with teachers and students from widely diverse cultural and socioeconomic backgrounds in prekindergarten through grade 12 classrooms. Research projects deal with the influence of family and family-school interactions on the development of literacy; the interaction of sociocultural factors and motivation to read; the impact of literature-based reading programs on reading achievement; the effects of reading strategies instruction on comprehension and critical thinking in literature, science, and history; the influence of innovative group participation structures on motivation and learning; the potential of computer technology to enhance literacy; and the development of methods and standards for alternative literacy assessments.

The NRRC is further committed to the participation of teachers as full partners in its research. A better understanding of how teachers view the development of literacy, how they use knowledge from research, and how they approach change in the classroom is crucial to improving instruction. To further this understanding, the NRRC conducts school-based research in which teachers explore their own philosophical and pedagogical orientations and trace their professional growth.

Dissemination is an important feature of NRRC activities. Information on NRRC research appears in several formats. *Research Reports* communicate the results of original research or synthesize the findings of several lines of inquiry. They are written primarily for researchers studying various areas of reading and reading instruction. The *Perspective Series* presents a wide range of publications, from calls for research and commentary on research and practice to first-person accounts of experiences in schools. *Instructional Resources* include curriculum materials, instructional guides, and materials for professional growth, designed primarily for teachers.

For more information about the NRRC's research projects and other activities, or to have your name added to the mailing list, please contact:

Donna E. Alvermann, Co-Director
National Reading Research Center
318 Aderhold Hall
University of Georgia
Athens, GA 30602-7125
(706) 542-3674

John T. Guthrie, Co-Director
National Reading Research Center
2102 J. M. Patterson Building
University of Maryland
College Park, MD 20742
(301) 405-8035

NRRC Editorial Review Board

Patricia Adkins
University of Georgia

Peter Afflerbach
University of Maryland College Park

JoBeth Allen
University of Georgia

Patty Anders
University of Arizona

Tom Anderson
University of Illinois at Urbana-Champaign

Irene Blum
Pine Springs Elementary School
Falls Church, Virginia

John Borkowski
Notre Dame University

Cynthia Bowen
Baltimore County Public Schools
Towson, Maryland

Martha Carr
University of Georgia

Suzanne Clewell
Montgomery County Public Schools
Rockville, Maryland

Joan Coley
Western Maryland College

Michelle Commeyras
University of Georgia

Linda Cooper
Shaker Heights City Schools
Shaker Heights, Ohio

Karen Costello
Connecticut Department of Education
Hartford, Connecticut

Karin Dahl
Ohio State University

Lynne Diaz-Rico
California State University-San Bernardino

Mariam Jean Dreher
University of Maryland College Park

Pamela Dunston
Clemson University

Jim Flood
San Diego State University

Dana Fox
University of Arizona

Linda Gambrell
University of Maryland College Park

Valerie Garfield
Chattahoochee Elementary School
Cumming, Georgia

Sherrie Gibney-Sherman
Athens-Clarke County Schools
Athens, Georgia

Rachel Grant
University of Maryland College Park

Barbara Guzzetti
Arizona State University

Jane Haugh
Center for Developing Learning Potentials
Silver Spring, Maryland

Beth Ann Herrmann
University of South Carolina

Kathleen Heubach
University of Georgia

Susan Hill
University of Maryland College Park

Sally Hudson-Ross
University of Georgia

Cynthia Hynd
University of Georgia

Robert Jimenez
University of Oregon

Karen Johnson
Pennsylvania State University

James King
University of South Florida

Sandra Kimbrell
West Hall Middle School
Oakwood, Georgia

Kate Kirby
Gwinnett County Public Schools
Lawrenceville, Georgia

Sophie Kowzun
Prince George's County Schools
Landover, Maryland

Rosary Lalik
Virginia Polytechnic Institute

Michael Law
University of Georgia

Sarah McCarthey
University of Texas at Austin

Lisa McFalls
University of Georgia

Mike McKenna
Georgia Southern University

Donna Mealey
Louisiana State University

Barbara Michalove
Fowler Drive Elementary School
Athens, Georgia

Akintunde Morakinyo
University of Maryland College Park

Lesley Morrow
Rutgers University

Bruce Murray
University of Georgia

Susan Neuman
Temple University

Awanna Norton
M. E. Lewis Sr. Elementary School
Sparta, Georgia

Caroline Noyes
University of Georgia

John O'Flahavan
University of Maryland College Park

Penny Oldfather
University of Georgia

Joan Pagnucco
University of Georgia

Barbara Palmer
Mount Saint Mary's College

Mike Pickle
Georgia Southern University

Jessie Pollack
Maryland Department of Education
Baltimore, Maryland

Sally Porter
Blair High School
Silver Spring, Maryland

Michael Pressley
State University of New York
at Albany

John Readence
University of Nevada-Las Vegas

Tom Reeves
University of Georgia

Lenore Ringler
New York University

Mary Roe
University of Delaware

Rebecca Sammons
University of Maryland College Park

Paula Schwanenflugel
University of Georgia

Robert Serpell
University of Maryland Baltimore
County

Betty Shockley
Fowler Drive Elementary School
Athens, Georgia

Susan Sonnenschein
University of Maryland Baltimore
County

Steve Stahl
University of Georgia

Anne Sweet
Office of Educational Research
and Improvement

Liqing Tao
University of Georgia

Ruby Thompson
Clark Atlanta University

Louise Tomlinson
University of Georgia

Sandy Tumarkin
Strawberry Knolls Elementary School
Gaithersburg, Maryland

Sheila Valencia
University of Washington

Bruce VanSledright
University of Maryland College Park

Chris Walton
Northern Territory University
Australia

Louise Waynant
Prince George's County Schools
Upper Marlboro, Maryland

Priscilla Waynant
Rolling Terrace Elementary School
Takoma Park, Maryland

Jane West
University of Georgia

Steve White
University of Georgia

Allen Wigfield
University of Maryland College Park

Dortha Wilson
Fort Valley State College

Shelley Wong
University of Maryland College Park

About the Authors

John T. Guthrie is Co-Director of the National Reading Research Center and Professor of Human Development at the University of Maryland College Park. He was formerly Research Director for the International Reading Association. He may be contacted at the following office address: 2102 J. M. Patterson Building, University of Maryland College Park, College Park, MD 20742. Phone: (301) 405-8036.

Lois Bennett is a teacher at Calverton Elementary School, Beltsville, Prince George's County, Maryland. She has been involved in the design of Concept-Oriented Reading Instruction from its inception and continues to expand this instructional framework.

Karen McGough received a master's degree in the Department of Human Development at the University of Maryland College Park in June 1993.

National Reading Research Center
Universities of Georgia and Maryland
Reading Research Report No. 10
Winter 1994

Concept-Oriented Reading Instruction: An Integrated Curriculum to Develop Motivations and Strategies for Reading

John T. Guthrie
University of Maryland College Park

Lois Bennett
Calverton Elementary School, Beltsville, Maryland

Karen McGough
University of Maryland College Park

Abstract. Our theoretical perspective is that students will become active, interested readers if they develop intrinsic motivations such as curiosity, aesthetic enjoyment, and challenge. Equally important to active reading is the development of the cognitive strategies associated with searching for information, comprehending literary works, and communicating to others in writing. The purpose of the project reported here was to design and implement a framework of conceptually oriented reading instruction to foster students' amount and breadth of reading, intrinsic motivations for reading, and strategies of search and comprehension. The framework emphasized five phases of reading instruction in a content domain: observing and personalizing, searching and retrieving, comprehending and integrating, communicating to others, and interacting with peers to construct meaning. Instruction was implemented in a year-long curriculum with a multicultural population of fifth-grade students in a Chapter 1 school. Measures of learning suggested that students who had Concept-Oriented Reading Instruction (CORI) for four months surpassed a comparison classroom in amount and breadth of reading and intrinsic motivations for reading. The CORI students gained significantly in the cognitive strategies of search and comprehension during the time period of four months. CORI instruction was contrasted to experience-based teaching and strategies instruction in terms of their support for motivational and cognitive development.

A variety of sources including diary studies (Anderson, Wilson, & Fielding, 1988), questionnaire surveys (Greaney & Hegarty, 1987), and the National Assessment of Educational Progress (Foertsch, 1992) point to the conclusion that relatively few students become avid, interested, involved readers. A shocking proportion of students are aliterate, which means that they choose not to read frequently or broadly, despite their cognitive capabilities.

Aliteracy among youth is a problem because a large proportion of the communities and subcultures in the United States rely on the written word to maintain their group identities and conduct their business. Active reading in

young adulthood is strongly associated with community participation (Guthrie, Schafer, & Hutchinson, 1991), political socialization (Adoni & Shadmi, 1980), and work place productivity (Mikulecky, 1987). From a cultural perspective, reading about one's interests and commitments is important not only because it expands knowledge and experience, but also because it strengthens the very interests and commitments that initiated reading activity (Deci, Vallerand, Pelletier, & Ryan, 1991; Pintrich & Schrauben, 1992).

Many educators believe that active reading is valuable as an avenue to reading achievement. This view is substantiated by evidence from diary studies of children and other indicators of amount of print exposure, such as title and author recognition (Stanovich & West, 1989), which suggest that wider reading is associated with higher reading vocabulary and comprehension. We suggest that beyond its utilitarian benefits, the disposition to read is a cultural asset and that the cultivation of active reading should be an explicit aim of instruction. To lay the groundwork for instruction that fosters wide and frequent reading, we introduce the notion of *reading engagement* and discuss some of the processes that may influence students' development of engagement.

Reading Engagement as Motivated Cognition

By the term *reading engagement* we mean the act of *choosing* to read frequently for a variety of reasons and *comprehending* the texts appropriately within the context of the reading situation. To pick up a book, read it, comprehend its essence, and permit it to influence one's mental and/or affective state, the reader engages a composite of motivational and cognitive processes. Just as selecting a book is based on motivations including value, expectation, interest, and self-confidence that the reader can understand the book, the reader's comprehension of the book entails cognitions such as the deliberate use of prior knowledge and strategies to construct meanings at many levels. Unless motivation and cognition are integrated, the acts of selecting books and apprehending their meanings are unlikely to occur.

The development of comprehension abilities and cognitive processes is the primary aim of much reading instruction, and enabling students to understand and to criticize new texts on new themes is a fundamental goal of many reading curricula. Teachers and researchers who believe in the primacy of comprehension, however, often make two vital assumptions: (a) they suppose that a student who is able to comprehend, will choose to comprehend, and (b) they assume that the comprehending student will select books, read at appropriate times, persist through difficult material, and gain satisfaction from reading. We suggest that these assumptions may not always be true. Some students who can comprehend will choose to read, but many will not. Although there is a correlation between reading achievement and amount of reading among elementary and middle school students (Cunningham & Stanovich, 1991), the range in amount of reading for this population is extremely small. Most students do not read very much, including many of those who can read very well.

We view reading comprehension as a potential for reading activity. Acts of choosing books, finding materials, and persisting are releasing agents. They release the potential of comprehension for the student's benefit. A student who comprehends well without reading frequently possesses a potential that is unrealized.

Although active reading depends partly on comprehension abilities, it depends more on motivations for reading. A classroom environment that supports the development of active reading creates contexts that satisfy the student's needs for curiosity, aesthetic involvement, challenge, competitiveness, and social exchange. The most central of these is curiosity, the desire to know more about something. All students have interests and preferences, and affording students opportunities to read according to their preferences is motivating.

Motivations for Reading

For the purposes of this report, we propose the following definition:

> Motivations for reading are internalized reasons for reading which activate cognitive operations that enable the individual to perform such acts as acquiring knowledge, enjoying aesthetic experiences, performing tasks, and participating in social contexts.

Motivation for reading is discussed here in the plural. Several different motivations are expected to be useful in characterizing students' school-relevant reading, including (a) curiosity, as in the desire to learn about a topic; (b) aesthetic involvement, as in the enjoyment of experiencing a literary text; (c) challenge, as in the orientation to learning complex ideas from text; (d) recognition, as in the gratification in receiving a tangible form of reward for success in reading; and (e) grades, as in favorable evaluations from a teacher.

These dimensions are based on the work on intrinsic motivation (Deci et al., 1991), values and goals (Wigfield & Eccles, 1992), and flow experiences (Czikszentmihalyi, 1978) that encompass both intrinsic (curiosity, aesthetic involvement, and challenge) and more extrinsic (recognition, grades) aspects of motivation. We include different kinds of intrinsic motivation specific to reading, in particular the notion of aesthetic satisfaction. We also distinguish different kinds of extrinsic motivation for reading, reflecting the fact that children do much of their reading in school where work is evaluated and grades and recognition become salient.

Our proposed motivations for reading also include (a) social, processes of constructing and sharing meanings in groups; and (b) compliance, adaptation to an external goal or requirement. With the exception of Wentzel's (1989) work in the general motivation literature and in-depth case studies of adults' purposes and interests in reading (Gray & Rogers, 1956), the social goals for reading have been infrequently discussed. But social motivations seem essential for reading since students read in groups during instruction and share texts in many social situations. In addition, teachers often have management goals, such as finishing a certain number of pages in a certain time period, which may become internalized by the students as a compliance motivation.

We further propose that reading efficacy, the belief that one can be successful at reading, is vital to becoming an active reader. Reading efficacy refers to students' perceptions of themselves as competent readers and learners, which are associated with academic achievement. Paris, Wasik, and Turner (1991) reviewed literature indicating that students who have a sense of control over their own learning achieve more and are more active in school than other students. Bandura and others have shown that self-efficacy, which is a belief in probable success, is associated with high performance in complex reading tasks and in mathematics (Schunk & Rice, 1987).

Motivations for reading may change over time in strength, number, or type. We suggest that reading motivations that are more intrinsic (curiosity, aesthetic involvement, challenge, social, self-efficacy) will increase in number and strength across time as a student becomes a more active reader. Students who become less active readers will diminish in the number and strength of their intrinsic motivations for reading. Conversely, extrinsic motivations (compliance, grades, recognition) will decrease in strength as students become more active readers.

Cognitive Strategies for Active Reading

Our definition of motivations for reading says that motivations will evoke cognitive strategies in learning situations. Dewey's (Archambault, 1964) original insight that interest drives thought has been confirmed empirically. Pintrich and DeGroot (1990) reported that students' sense of the intrinsic value of the content of a course was associated with their reports of self-regulation of strategies to learn the course material. Nolen (1988) supported this conclusion, showing that an orientation to learning the concepts of an instructional unit, rather than meeting the demands of assignments, was associated with the successful use of complex, productive learning strategies.

In this project, we were particularly interested in three cognitive strategies: searching for information (Gaskins et al., in press); comprehending texts (Pressley, Schuder, Teachers in the Students Achieving Independent Learning Program, Bergman, & El-Dinary, 1992); and composing reports to be read by peers (Beach & Hynds, 1991). Many students have not learned these strategies well and instruction in them is clearly needed. One recent instructional study suggests that search, comprehension, and composition can be taught, although classroom applications of the full set of strategies are only beginning to be attempted (Gaskins et al., in press).

The results of this research suggest that instruction should be based on intrinsically interesting content. An emphasis on motivational development leads us as instructional designers to give priority to compelling topics, such as ecology, space exploration, animal kingdoms, and energy, as points of departure for literacy instruction.

Intrinsic motivations lead students to use their conceptual knowledge and activate their cognitive strategies. We refer to conceptual knowledge as students' understanding of a discipline either in terms of its objects or in terms of events and their relations (Reif & Allen, 1992). Holland and his colleagues (Holland, Holyoak, Nisbett, & Thagard, 1989) represent a concept as a rule-based mental

model. The concept is a network of objects, their associations, their predictive relations, and their relations to us, the observers. For example, the concept of satellite consists of the objects (Earth and satellite), their relations to each other (gravity and relative motion), and their relation to the observer. Motivations such as curiosity for learning about a spaceship activate relevant conceptual knowledge. This activation dramatically facilitates the acquisition of new concepts from texts (Anderson & Pearson, 1984).

We expect that intrinsic motivations such as curiosity, aesthetic involvement, challenge, and social interaction will have an arousing effect on conceptual knowledge. At the same time, intrinsic motivations are likely to activate the strategies of search, comprehension, and composition. As students use their cognitive strategies successfully, the motivations that lead to their use will be strengthened. Thus, motivation and cognitive strategy use were expected to increase simultaneously and to contribute jointly to increases in the amount and breadth of student reading.

Studies of motivated strategy use imply that cognitive aspects of reading should be taught in contexts where they will be immediately useful. Reading strategies are vitally important aims of instruction, but strategies should be understood and learned by students as flexible tools for meeting their needs and satisfying their intrinsic motivations.

Does Instruction Influence Students' Reading Activities and Motivations?

Whether education programs accomplish the goal of enabling students to become active readers is a matter of serious doubt, primarily because there is little empirical evidence on the point. Although reviews of motivation research suggest several broad principles for organizing instruction (Ames, 1992), there are few instructional experiments to document the power of these principles. Regardless of the lack of experimental evidence, several programs seem likely to enhance the disposition to read actively because they engage students in substantial amounts of diverse reading during instruction. For example, in some whole language programs, writing tasks are emphasized, students assist in selecting reading materials, and small teacher-led groups work on literacy tasks. Activities such as these may foster the disposition to read and write independently (Hiebert & Fisher, 1990).

Inquiry approaches in which students learn to read through the purposeful use of a variety of literary texts seem likely to foster reading activity. In Blumenfeld's approach, students participate in inquiry through a project which is the center of the curriculum. Students attempt to produce a tangible artifact, such as an historical map with commentary. The project often involves student choice of topic, individual pursuit of resources for learning, and teacher-guided group literacy activities (Blumenfeld et al., 1991). Fillion (1981) recommended a similar inquiry-oriented curriculum with literature as the centerpiece. To date, however, the benefits of these educational programs on students' reading engagement have not been thoroughly examined using traditional procedures for the verification of generalized conclusions, that is, experimental investigations. As a result, there is scant evidence regarding whether these interventions deliver long-term benefits to literacy learners.

Some empirical support has been reported for independent reading and writing programs that promote young children's use of literature. Morrow (1992) reported on an intervention that provided abundant reading opportunities, reading materials, and social support for storybook reading among first-graders. Compared to students in basal programs who spent an identical amount of time in other skill-oriented learning activities, students in the independent reading and writing groups studied by Morrow read books more frequently, spent more time reading, read longer books, and expressed more positive attitudes toward storybook reading.

Guthrie, Schafer, Wang, and Afflerbach (1993) reported that students at grades 4 and 7 were likely to report relatively high reading activity if they frequently shared books with friends and family, had a teacher who provided instruction in comprehension, used cognitive and reading strategies appropriately, and enjoyed relatively high levels of home support for literacy. These data are noteworthy because they capture a representative national sample of students and schools and suggest that instructional programs that simultaneously provide for social interaction, cognitive strategy learning, and teacher emphasis on comprehension may increase students' disposition toward more frequent, more diverse literacy activity.

The intervention-oriented findings outlined in the previous two paragraphs suggest that interaction among peers in a social milieu contributes to motivational and cognitive development. When students participate in a learning community, they deepen their culturally relevant interests, strengthen their cognitive strategies for pursuing their interests, and acquire social participation norms that enable them to function effectively in groups. Peer-peer interaction should be interwoven with the conceptual context.

An Instructional Framework for Increasing Reading Engagement

Based on research in motivation, cognition, and instruction in reading, as well as our experience in teaching, we expected that an instructional framework that enhanced students' long-term literacy activity would have to address student needs for the following:

- Observing and personalizing "real-world" problems as a basis for intrinsic motivations for reading
- Learning a variety of cognitive strategies for exploring these problems
- Interacting socially to construct conceptual knowledge
- Communicating their understanding to genuine audiences

Consequently, our framework, which we termed Concept-Oriented Reading Instruction (CORI), consisted of five instructional dimensions, descriptions of which follow.

Observing and personalizing. To create a context for the motivations of curiosity, aesthetic involvement, challenge, and self-efficacy in reading, we attempted to enable students to observe and think about the concrete objects and events in the "real world" around them. Student choice in selecting the subtopics, goals,

and materials for learning was emphasized. We expected that sustained work on a conceptual issue of personal interest would enable students to augment their conceptual knowledge as they learned increasingly complex reading strategies (Pintrich & Schrauben, 1992).

The main point of the observing and personalizing phase of instruction was to support students in developing and expressing their personal interests in the world around them. This phase also included bringing background experience and knowledge into the learning and exploration processes. We encouraged students to select a subject important to them and to identify topics (such as moon craters) to which they wanted to devote time and energy in their learning.

Searching and retrieving. Students were taught how to search for subtopics related to their general interests, how to search for informative resources, such as books, and how to find opportunities for further real-world observation, all of which could extend their knowledge and satisfy their curiosities. Students chose their own science trade books to use in learning about the subtopics they selected. We expected that as students acquired concepts according to their choices, they would be motivated to form increasingly higher order abstractions and generalizations about the themes they were studying.

This instructional dimension emphasized the cognitive strategies students needed to pursue and satisfy their explicitly stated topical interests. We began by teaching students to search and select resources. Forming an overview of resources such as books, globes, or sites for field observations was important, as was understanding the organization of a classroom library, an expository trade book, and the pages of an illustrated reference work, and being able to skim and scrutinize texts, graphs, charts, maps, tables, and schedules.

Comprehending and integrating. The comprehending and integrating portion of the instructional framework encompassed the following comprehension strategies: (a) determining the topic of a text selection; (b) detecting critical details; (c) summarizing the text; (d) making comparisons between texts; (e) developing criteria for evaluating a book; and (f) critically reflecting on the author's point of view and presentation of information.

To create an inclusive base for students' literacy development, we incorporated the objective of connecting literary experience to conceptual understanding. We wanted students to be able to identify plot, character, setting, and theme in narrative and literary works such as novels and folktales. We also wanted to enable students to respond aesthetically to literature through considering other points of view.

Communicating to others. Many exciting educational programs contain high expectations for communication. Some programs emphasize writing (Hiebert & Fisher, 1990); whereas others emphasize construction of a tangible artifact such as a map or a diorama (Blumenfeld et al., 1991). High expectations for purposeful communication are likely to lead students to enjoy the processes of observation, inquiry, reading, writing, and problem solving with peers.

In our framework, presenting a coherent message in the form of a written report, a class-authored book, or a diorama were consid-

ered appropriate syntheses. Students were expected to identify important information, to organize that information into a coherent form, and to express their ideas precisely and convincingly. They were expected to develop critical stances toward texts by applying evaluation criteria to a variety of materials. The major aim of the communicating to others instructional dimension was to enable students to express their understandings about topics of personal interest in a variety of coherent, persuasive, and accurate communications to classmates or other audiences of their choosing.

Peer-peer interaction. We created a cycle of opportunities for social interaction. Evidence is accumulating that participating in a learning community sustains interest in learning, permits higher order integration of ideas, and fosters the internalization of social processes of constructing meaning (Almasi, 1993). However, some social communication structures are more likely than others to foster efficient, coherent, and complete thinking and learning (Johnson, Johnson, Stanne, & Garibaldi, 1990). We emphasized peer-led discussion in which the group had the common goal of understanding the concepts and the reading strategies that were the focal points of the lessons.

Guiding Questions

In this project, we used the following five questions as guides:

1. Can we design, implement, and document an instructional framework for reading that is oriented to conceptual learning, incorporates strategy instruction, and provides for social interaction among students?
2. Does CORI influence students' amount and breadth of reading activity?
3. Does CORI influence students' motivations for reading?
4. Does CORI improve students' cognitive strategies for reading?
5. Does CORI increase students' ability to acquire conceptual knowledge?

METHOD

Participants and Setting

The instructional development project described here was undertaken at Calverton Elementary School, Prince George's County, Maryland. Calverton is a multicultural, Chapter 1 school. The county and school participate in the Maryland School Performance Program, which encourages schools to develop innovations to teach higher order reading processes and to integrate reading with real world projects and a variety of contents. The fifth-grade science teacher, the reading teacher, and the university researcher proposed the program and were supported by the principal, the county supervisor of reading instruction, and the county supervisor of science instruction.

One fifth-grade class participated in the first year of the multi-year project that is reported here. Of the 25 children introduced to the Concept-Oriented Reading Instruction (CORI) approach, 52% percent were African

American, 36% were European American, 6% were Latino, and 6% were Asian. Working in collaboration with the researchers and reading teacher, one classroom teacher implemented CORI during the reading and science periods for five weeks, and then in the reading period alone for five weeks. Each class session in reading met for 90 minutes; science classes were 50 minutes long. Twelve of these daily sessions were videotaped and coded as a means of capturing the nature and flow of the teaching and learning.

Planning began in the summer of 1992. The development team composed the goals for reading and science, identified trade books in science and literature, and devised a framework to organize the classroom activities over the course of the fall of 1992, which was to be used again in the spring of 1993.

Instructional Framework

The framework for CORI is described in terms of a unit about the moon and the solar system that was taught in the fall of 1992.

Observe and personalize. Science goals in this unit were a blend of science content and science process. The main theme in the fall was patterns and cycles and the content objectives included (a) recognize patterns of revolution throughout the universe, such as the movements of the moon and planets, and lunar and solar eclipses; (b) describe the features and phases of the moon; (c) describe the planets and their primary characteristics, such as size, distance, temperature, and features; and (d) describe the problems associated with human travel in space. Although it will not be treated extensively here, the theme of CORI instruction in spring 1993 was systems and interactions. The content objectives emphasized ecology and included (a) understand the principles of energy transfer in a food web; (b) describe how living and nonliving things interact in an ecosystem; (c) recognize the importance of cycles in an ecosystem; (d) describe the primary features of six major biomes; (e) identify plants and animals from each major biome; and (f) recognize how humans have altered the environment.

The science process goals included (a) developing simple investigations using the scientific method, (b) identifying variables, (c) finding ways to control and manipulate the identified variables, (d) collecting, organizing, recording, and analyzing data, using lab equipment, and (e) constructing visual representations of data (charts, graphs). More specific science processes included (a) constructing physical models for explaining the phases of the moon, (b) keeping a journal or log recording direct observations of moon patterns and movement, (c) drawing conclusions based on direct observations, and (d) integrating information from observations and textual sources to form higher order concepts to explain phenomena about space or ecology.

Students were guided to observe the daily changes in the appearance of the moon as part of the Earth-Moon-Sun sky system. Students personalized their learning by first listing what they knew and then writing down those things they wanted to learn more about. Students expressed curiosity about the moon's size and origin, why the moon appeared to have different shapes, what caused its light and dark areas, and what caused lunar craters. During the investigation of the Earth-Moon-Sun sys-

tem, students became interested in other aspects of the solar system and space travel.

To begin the moon and solar system unit, the teacher held discussions with the class about the moon and how it looks. On the first day, students shared their prior knowledge and general notions about the moon, and these were charted. The following morning, the class went outside to observe the shape of the moon and to start their "Lunar Log." With modeling from the teacher, the students drew what they saw and recorded and dated their observations. In later lessons, students were asked to make predictions and draw conclusions from the patterns observed. As the lessons continued, the concepts students were reading about were supported in science classes with additional hands-on activities to help students make the connections. For example, students used flashlights, styrofoam balls, and other objects to construct models to help them understand the movements of the earth and moon. They also studied lunar maps and investigated variables that affect crater formation.

In the second half of the fall period, a number of students became interested in other aspects of the solar system and looked in the school library and the local library for books about various planets. This led to the formation of interest groups composed of students who wished to learn more about a particular planet. Each student was involved in researching and writing a report with support from the group. The teacher webbed topic ideas with the students and used scaffolding techniques to show students how to construct an outline to organize their notetaking activity and how to develop and refine their final reports.

Search and retrieve. The students were taught how to look for resources, ideas, and information. They conducted further observations of the moon, and they used a variety of texts and illustrations over an extended period of time. The teacher continued to focus on concepts about the moon and the solar system. She used probing questions and modeling to show students how to search for and find information in trade books. Using modeling and scaffolding techniques, she showed students how to search the indexes and tables of contents of books to find specific information about such topics as craters, space travel, and life on the moon.

After teacher modeling, students worked in concept groups to continue learning about the moon. In these cooperative groups, students made decisions about how to search for more resources and how to organize their ideas.

After the moon unit, students studied the solar system. Each student chose a planet and joined a group of two to four students to develop their understanding and write a group report. In the second half of the fall period, a number of students began seeking out books in the school library on other aspects of the solar system. This led to the formation of cooperative groups composed of students interested in studying a particular planet of their choice. Each student was involved in researching and writing a report with support from the group.

Comprehend and Integrate. In this phase, the teacher used scaffolding techniques to show students how to identify important ideas in a single text, and she modeled how to combine ideas from multiple texts. Specifically, students practiced identifying topics, recognizing

important ideas, and writing summaries about what they read. Ample opportunities for review, practice, feedback from the teacher, and reflection about their work were provided. Students learned to combine information from their observations and science lab experiences with information they gained from reading. The reading materials also included novels, folktales, and poems, to enable students to connect their experiences reading narrative with their conceptual understanding acquired from reading expository texts.

Opportunities for social interaction are vital for both cognitive and motivational development. Peer-peer interaction was encouraged at all phases of CORI. During several sessions, we observed the fifth-graders reading silently and to one another as they attempted to understand the material. We noted that students were often engaged in elaborate discussion about which material provided answers to their questions and which information did not. An example of this type of discussion took place during a conversation about life on the planet Mars. One member of the group, "John," who insisted life did exist on Mars, was asked to identify the book he used to support his belief. A second member, "Patty" noted that "This book talks about what it *might* be like to live on Mars, but it doesn't say that there is *really* life on Mars" [italics added]. After another round of discussion, during which a third member of the group also expressed doubt about whether life could exist on Mars, "Patty" volunteered to return to the classroom library to find another book about Mars. Many episodes of this kind of debate and resolution occurred throughout the lessons. It is important to note that during group discussion students raised other issues related to the concepts and often expressed personal beliefs and opinions about them.

Communicate to others. During the final phase of instruction, students composed a report to communicate what they had learned to other students. In this phase, the teacher taught how to take notes and how note taking differed from copying. Organizing notes into an outline was taught with teacher modeling and students sharing their organizational schemes with other students. Composition of the reports was taught with a process approach of drafting and revising. Peer-peer interaction was encouraged at designated periods to enable students to compare, reflect, criticize, and elaborate their writing.

Materials

Trade books were the center of the reading curriculum. For example, class sets of *The Illustrated World of Space* (Macmillan/McGraw-Hill) and *The Wonderful Flight to the Mushroom Planet*, by Eleanor Cameron, were used. Several books were used as group sets for each of the eight groups of students in the class, including *Small Worlds* by Joseph W. Kelch and *Space: Stars, Planets, and Spacecraft* by Sue Becklake. The classroom library contained a range of expository books such as *Living on the Moon*, *The Moon Seems to Change*, *The Earth*, and *Moons and Rings*. Students also read such narratives as *The Orphan Boy*, *They Dance in the Sky: Native American Star Myths*, and *On the Day You Were Born*, which portrays the Earth beings'

place in the solar system through pictures and story.

DOCUMENTING INSTRUCTION

Comparing CORI to Other Instructional Approaches

We compared CORI to two other modes of reading instruction, one based on schema theory, in which background knowledge is emphasized, and one based on strategy learning. The schema-based approach was exemplified by the KEEP program (Au & Mason, 1981), and the strategies instruction was exemplified by the SAIL program (Pressley et al., 1992). Videotapes of the CORI, SAIL, and KEEP instructional approaches were compared.

The videotapes of CORI, SAIL, and KEEP had a common purpose. Each was presented by its authors and participants as a worthy characterization of a set of goals and procedures for teaching reading at the elementary school level according to a set of learning and instructional principles. However, the videotapes varied on several factors that precluded a simple contrast between them on any single aspect of instruction. The students in the SAIL tape consisted of a small group of six advanced second-graders; the students in the KEEP tape were a small group of six fourth-graders who were quite familiar with the instructional patterns; and the CORI tape showed whole-class teaching for twenty-five fifth-graders who were being introduced to the instructional approach. The SAIL tape was intended to depict one prototype lesson of 40 minutes at the end of a year of instruction; the KEEP tape showed one week of instruction; and the CORI tape showed samples of an instructional program taken over a three-month period. Although the SAIL and KEEP tapes were scripted events designed for video, the CORI presentation was edited from a substantial corpus of non-scripted classroom tapings. Despite these differences, each of the tapes was designed to represent the prototype of an instructional approach and was circulated as such.

We observed and coded the videotapes of the SAIL, KEEP, and CORI classrooms using the coding rubric described in the following section.

Coding Rubric for Instructional Tapes

Observe and personalize. Students observe a real world phenomenon such as a bird, a stream, an historical document, or a political debate. They record their observations by taking notes, drawing illustrations, or collecting numerical information. They may manipulate or experiment with objects or events.

Activate background knowledge. The teacher elicits the students' existing knowledge and/or experience about a topic of instruction through questions, class discussion, or written assignments. Students may be asked to think about or share their personal beliefs, knowledge of facts, or memory of previously learned material, whether the material was learned in or out of school.

Strategy instruction. The teacher explicitly attempts to impart one or more learning/reading strategies. The teacher is likely to state the name and to describe the purpose of a strategy. The teacher may model or demon-

strate the use of a strategy and ask students to try it. Students may attempt to use the strategy individually or in groups, and they may talk about their successes or failures.

Peer-peer interaction. Students talk directly to each other in pairs or small groups. They may jointly search for information, compare ideas or notes, or debate opinions. The teacher may set the theme, but does not constrain the content or the interpersonal interactions. Students direct their observations, questions, and commentary to each other rather than to the teacher, building on the views and information voiced by other students. Students may work on a common problem, topic, or strategy.

Writing. Students may read silently while taking notes on their reading, compose an outline, letter, or report, or individually spend time locating books or information for use in their reports.

Procedures for Coding Videotapes

The tapes were partitioned into either nine or ten segments of three minutes each. Two coders rated each segment of each tape as high, medium, or low on each of the instructional dimensions described in the Coding Rubric section. A high rating signified that the dimension was clearly evident for the large majority of students for the large majority of the time in the segment; a medium rating signified that the dimension was evident for part of the students most of the time or for most of the students part of the time; a low rating signified that the dimension was rare or nonexistent during the time interval. The pairs of coders varied for each tape. Each of six coders presented her ratings to the full group. Differences between raters were discussed and resolved by the first author. The outcomes of these ratings are presented in the results section.

DEVELOPMENT OF ASSESSMENTS

Motivations for Reading Scale

The Motivations for Reading Scale was developed in the spring of 1992 as an indicator of what impels students to read. We initiated this project by conducting interviews of 30 to 45 minutes with eight fifth-grade children (four individuals and one focus group of four students) at the elementary school in which the study was being performed. We asked students about their beliefs and attitudes toward school reading (i.e., reading groups and science class) as well as personal reading that was independent from school. The interviews were transcribed and coded using a constant comparison (LeCompte & Preissle, 1993) procedure to identify reasons for reading. The information provided by these students allowed us to formulate ten constructs related to motivation to read: social, compliance, self-efficacy, curiosity, aesthetic enjoyment, recognition, grades, challenge, competitiveness, and work avoidance. Eight statements using the students' language were developed for each of the ten constructs, and were rated by students on a 4-point scale from "a lot like me" to "not at all like me." For example, the construct "Social" had the following statement as one of its correspondents: "I talk to my friends about what I am reading." For other examples, see Appendix A.

Reading Activity Inventory. A Reading Activity Inventory questionnaire was developed to measure the amount and breadth of students' reading activity. The inventory was composed of three sections: general activities, school reading, and personal reading. It asked students to provide titles, authors and/or topics of the books they read in the areas of science, literature, and social studies, for school reading, and in the areas of mystery/science fiction, sports, adventure, nature, people, comic books, and magazines, for personal reading. Students also provided frequency information for these reading activities.

Cognitive Strategies and Conceptual Learning: A Performance Assessment

We developed an assessment that was an instructional unit in which we traced the students' performance as they used their knowledge and strategies to learn a new concept. This is a "school-like" learning situation in which the broadest possible range of reading competencies is covered, including word recognition, vocabulary, word attack, sentence comprehension, paragraph comprehension, summarizing, detecting inconsistencies, integrating illustrations and text, coordinating multiple sources of information, writing a synthesis of information and knowledge, perceiving character and theme in narrative, and applying knowledge and experience to solve new problems. Students who score high on this measure may be expected to score high on measures of all the "lower-level" competencies required to accomplish this complex set of tasks.

The assessment was composed of seven stages that were presented to students over a period of six days. Students were provided with packets that contained questions concerning a scientific concept they were to study. The questions concerned either the phases of the moon or the tides. The class was divided so that during the pre-assessment in September, half studied materials on the phases of the moon while the other half studied materials on the tides. During the post-assessment in December, the students studied the alternate topic. A description of the seven stages follows:

Stage I: Engage Students in Topic. The lesson began with a brainstorming activity. Students were presented with manipulatives such as clay, flashlights, a wooden stick (moon), and a balloon (tides) to activate their thinking about the causes of moon phases and tides.

Stage II: Statement of Prior Knowledge. Following the introductory activity, students were asked to describe their personal view of the different shapes of the moon or the ocean tides on earth. They were also asked what other facts or ideas would help them learn about this topic.

Stage III: Searching for Information. A "library" of information packets was provided for each student. Each packet consisted of ten sections taken from trade books pertaining to the topic. Irrelevant information was included in five of these packets to discern whether or not students selected appropriate information.

Students were asked to use the library of resources provided. They were told that some resources would be helpful and others would not. They were to choose the ones that would

be valuable to them and to explain their reasons for their choices. They were then given a log that was divided into three sections: A, B, and C. They were directed to write down the packet number (A) and the reason why they chose the packet (B). Then they read the material for as long or as short a time as they wanted. They recorded whether the packet helped them and what they learned from it. They took notes in section C of the log page. This section required two days.

Stage IV: Visual Solution. Students used the ideas they had learned from the packets to make a chart, drawing, or diagram to illustrate their understanding of the topic. They were requested to label all of the components of their solution.

Stage IV continued: Verbal Solution. Students used their notes, drawings, and what they remembered to write an explanation of the topic.

Stage V: Application/Extension. Students applied what they learned to a novel problem, such as the following:

> Moon: Mars has two moons. If you were on Mars, could you see two full moons at the same time? Why or why not? Please explain your answer.
>
> Tides: If the moon was three times closer to the earth, how would the tides change? Why or why not? Please explain.

Stage VI: Expository Text Comprehension. Students were provided with two pages containing text and illustrations from a trade book. The topic was related but not identical to the topic they were studying. They were asked to answer a question concerning the information they read, as in the following examples:

> Moon: *People on the Moon.* From this material, describe how the astronauts collect rocks on the moon.
>
> Tides: *Earthquakes.* From this material, describe the types of damage caused by earthquakes.

Stage VII: Narrative Text Comprehension. Students were provided with a folktale to read. They were asked three questions referring to the story.

> Moon: *How Coyote Was the Moon*
> 1. Why did coyote become the moon?
> 2. How does this legend explain a coyote's behavior?
> 3. Do you think the people should have taken coyote out of the sky? Why or why not?
>
> Tides: *How Raven Made the Tides*
> 1. How did Raven make the tides?
> 2. Why did Raven want the old woman to let go of the tide line?
> 3. Do you think Raven should have tricked the *very* old woman? Why or why not?

Scoring Rubrics. The scoring rubrics for this assessment were developed by examining the responses of students to the pre-assessment and post-assessment tasks, sorting the responses into five levels, describing the characteristics

of performance at each level, and assigning point values to each level. A general rubric for each measure was developed to apply to all contents and all fifth-grade students. Specific rubrics were constructed to guide coding for particular tasks. Rubrics may be obtained by writing to the authors.

The validity, reliability, and usability of performance assessments are complex issues. The criteria for systemic validity recommended by Frederiksen and Collins (1989) are reasonably well satisfied by this measure. Materials and tasks are authentic to classroom instruction; the requisite psychological processes are evident to teachers and students; the scoring rubrics represent plausible developmental progressions; and the scores possess substantial interrater agreement. Further discussion of these issues may be found in Frederiksen and Collins (1989), as well as columns on assessment in *The Reading Teacher*.

RESULTS

The results were analyzed to address the five questions that were posed at the end of the introduction.

1. Can we design, implement, and document an instructional framework for reading that is oriented to conceptual learning, strategy instruction, and social interaction among students?

As we indicated in the Method section, planning and design of the instructional framework occurred during the summer of 1992. The instruction was initiated when school began in September; videotaping began in the first month and continued until the end of December. The instruction can be observed in a 30-minute videotape entitled CORI.92. CORI can be seen in perspective by comparing it to schema-based and strategy-based instructional approaches that are presented in Figures 2 and 3 respectively.

Comparisons of instruction. The results of the codings, presented in Figures 1, 2, and 3, show three instructional approaches. Each approach has unique features.

Concept-oriented reading instruction is characterized by a high emphasis on each of the five instructional dimensions at one or more points in the tape. Instruction was initiated with an emphasis on observing real world phenomena and developing personal interests for learning. The teacher activated the students' background knowledge and helped them form preliminary theories about the topic of instruction. At this stage, strategies for the science activities of observing and recording were taught, but strategies for reading were not included.

As instruction proceeded, reading strategies that enabled students to search for books, materials, and other information were taught, and comprehension strategies were introduced in the context of the science concepts. Peer-peer interaction increased as students became able and interested in discussing the concepts of the curriculum and their strategies for learning. As students improved in their command of the conceptual domain, in their use of search strategies, in comprehension, and in communicating to others, the teacher emphasized independent writing.

The strategy-based program (SAIL) was characterized by sustained instruction in several cognitive strategies. The dimension of peer-

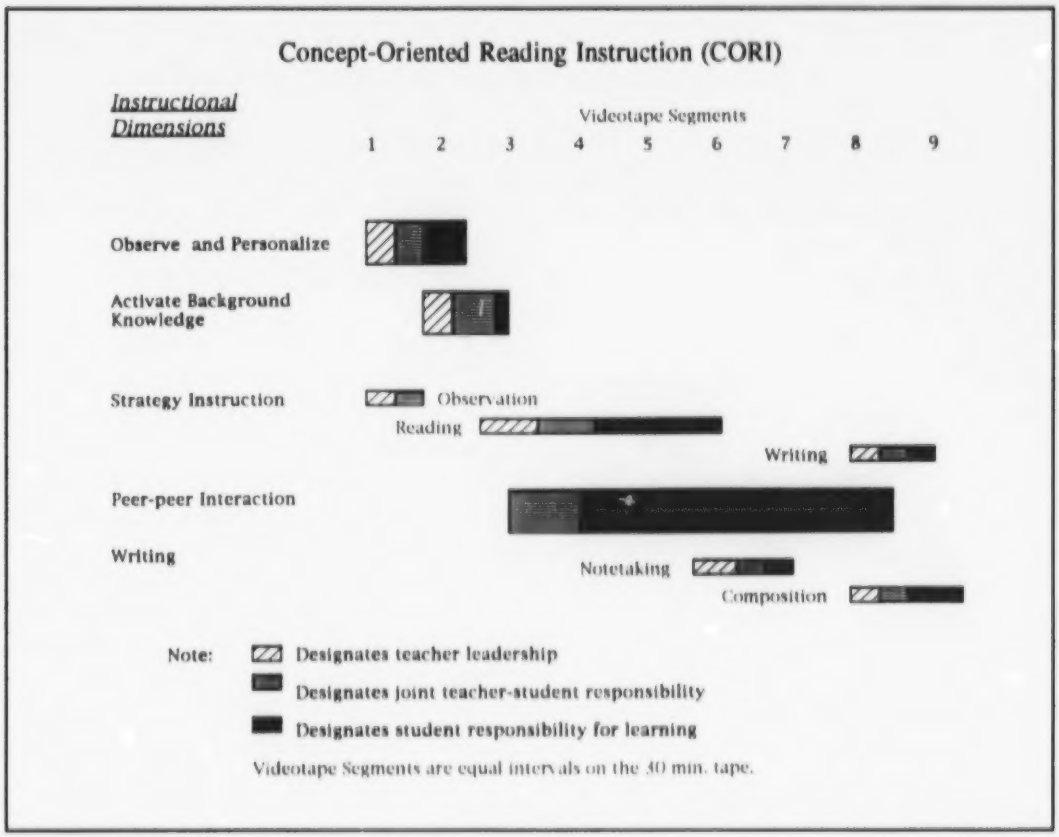

Figure 1. Dimensions of Instruction in Concept-Oriented Reading Instruction.

peer interaction was not part of the design of this instruction, and student interaction occurred only at brief periods at the middle and end of the instruction as students consolidated their understandings of the content of the text. Activating background knowledge occurred at the end of the instruction, as the teacher helped the students make connections between the text and their personal experiences.

The schema-based instruction, as it was portrayed in the KEEP tape, emphasized the process of activating background knowledge, which was high or moderate in occurrence throughout the tape. Strategies of predicting the content of the text and summarizing were apparent in the middle portions of the instruction. Consistent with the intentions of the KEEP authors, peer-peer interaction and direct observational activities were not apparent. Independent reading and writing took the form of silent reading with no writing activity.

The video from the CORI classroom showed that the implementation of CORI was reasonably consistent with the program's

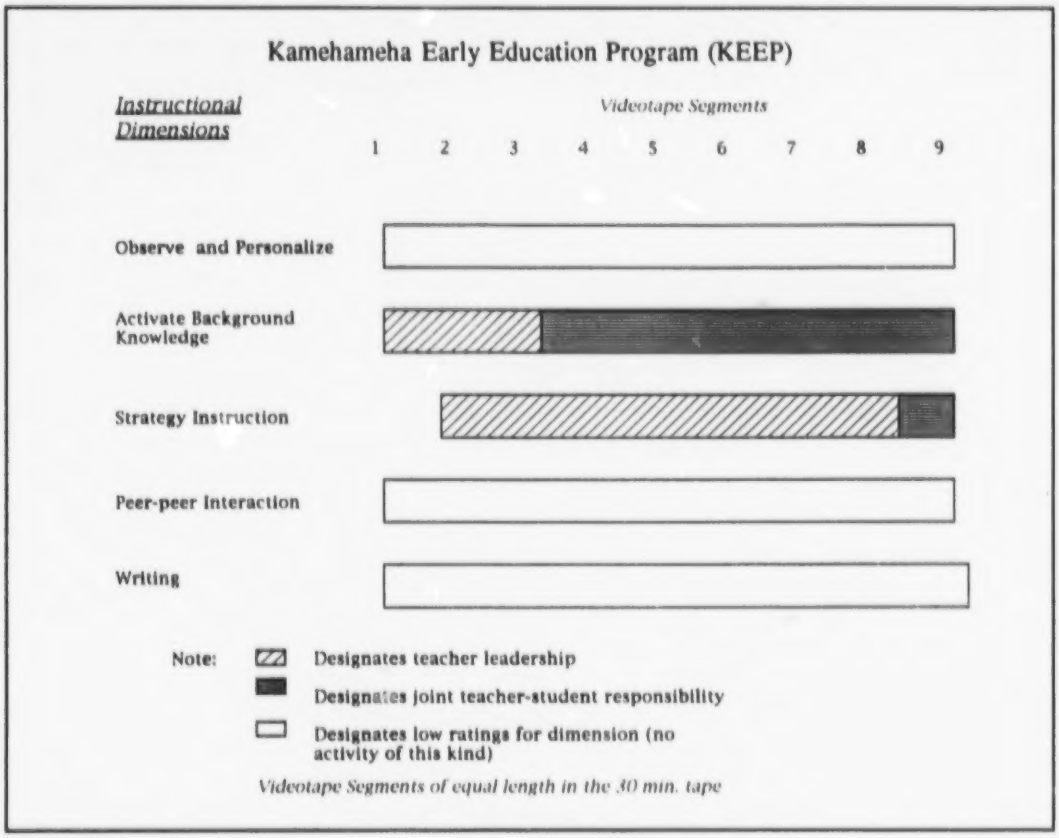
Kamehameha Early Education Program (KEEP)
Instructional Dimensions
Videotape Segments
1 2 3 4 5 6 7 8 9
Observe and Personalize
Activate Background Knowledge
Strategy Instruction
Peer-peer Interaction
Writing
Note:
Designates teacher leadership
Designates joint teacher-student responsibility
Designates low ratings for dimension (no activity of this kind)
Videotape Segments of equal length in the 30 min. tape

Figure 2. Dimensions of Instruction in Schema-Based Reading Instruction.

objectives and design. Students interacted with the concepts, the reading materials, and with each other as we hoped they might. The instructional dimensions formed a pattern across time that seems likely to be valuable and useful in other classrooms.

2. Does CORI influence students' amount and breadth of reading activity?

To address this question, we compared the students in the CORI program with the students in a classroom in the same school that was using a basal program for reading instruction (BASAL). The teachers at the fifth-grade level and the school's principal considered the two classes to be comparable in reading achievement at the beginning of the school year. The students' responses to the Reading Activity Inventory, which was given in February 1993, are shown in Figure 4. The amount and breadth of reading in the CORI classroom was significantly higher than the amount and breadth of reading in the BASAL classroom.

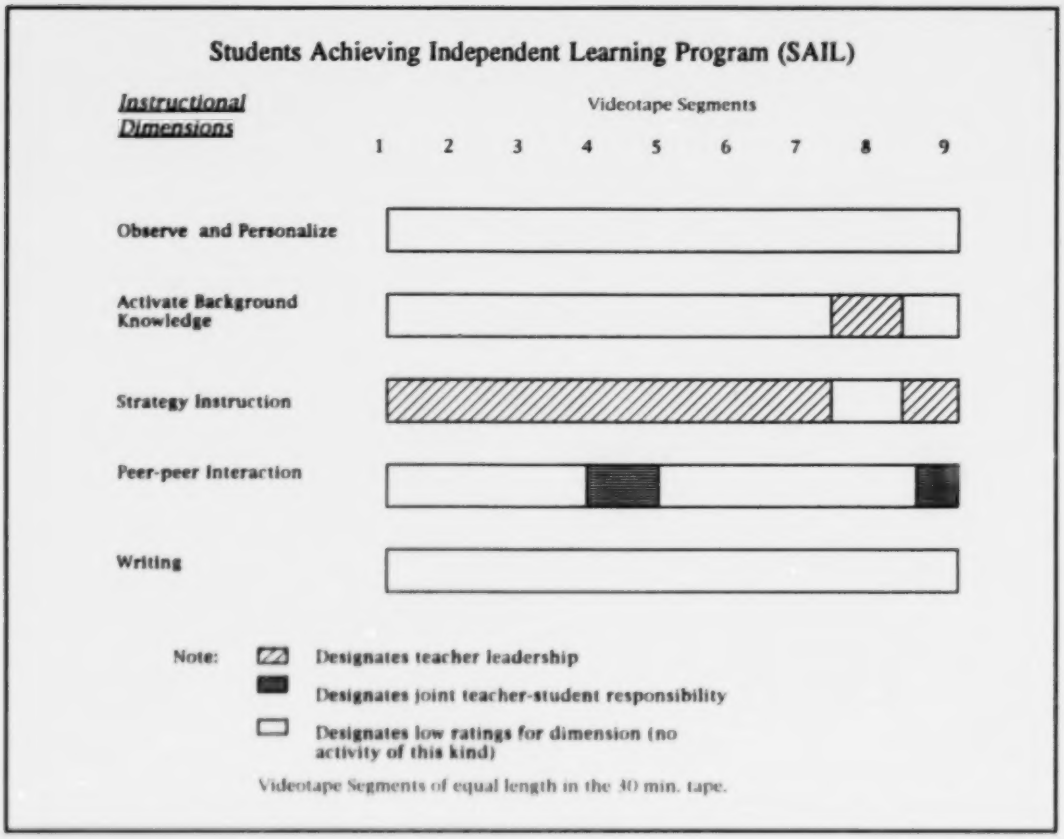
Students Achieving Independent Learning Program (SAIL)
Instructional Dimensions
Videotape Segments
1 2 3 4 5 6 7 8 9
Observe and Personalize
Activate Background Knowledge
Strategy Instruction
Peer-peer Interaction
Writing
Note:
Designates teacher leadership
Designates joint teacher-student responsibility
Designates low ratings for dimension (no activity of this kind)
Videotape Segments of equal length in the 40 min. tape.

Figure 3. Dimensions of Instruction in Strategy-Based Reading Instruction.

A one-way analysis of covariance between the two groups with the total score for reading (combining school and personal reading) on the Reading Activity Inventory as the dependent variable and the general activity measure on the Inventory as a covariant was significant, $F(1, 34) = 4.75$, $p < .036$.

(The National Reading Research Center will be publishing a version of the Reading Activity Inventory used in this study as part of its series of Instructional Resources.)

3. Does CORI influence students' motivations for reading?

The issue was addressed by comparing the CORI and BASAL classrooms on the Motivations for Reading questionnaire, which was administered in February 1993. The questionnaire is divided into 9 motivational constructs, plus the construct of self-efficacy for reading, as described in the Method section. Self-efficacy was not treated as a motivation for read-

ing because it was not a "reason for reading." Rather, it was considered to be a related dispositional construct. For each motivational construct, we compared the means from the CORI and the BASAL classrooms. Results are divided into intrinsic and extrinsic motivations and are shown in Table 1. Of the intrinsic motivations, the CORI students scored higher on *curiosity*, *aesthetic enjoyment*, *social*, *challenge* and *competitiveness*. Of the extrinsic motivations, the CORI students scored higher on orientation to *grades*, and the BASAL students scored higher on *recognition*, *compliance*, and *work avoidance*. The BASAL group was higher on self-efficacy.

Table 1. Distribution of Intrinsic and Extrinsic Motivation in the CORI and BASAL Classrooms

	Classroom	
Motivations	**CORI**	**BASAL**
Instrinsic	curiosity aesthetic enjoyment social challenge	self-efficacy
Extrinsic	grades	recognition compliance work avoidance

To examine statistical significance, a chi-square test was conducted on the motivations for reading that are shown in Table 1. It showed a statistically significant effect ($X^2 = 4.32$, $df = 1$, $p < .05$). Note that self-efficacy is an important self-perception, but it is not strictly a motivation by our definition of the term; consequently it was excluded from the calculation. The Yates correction was used for the null cell, and we made no correction for discontinuity. In sum, the CORI classroom was characterized by intrinsic motivations for reading; whereas the BASAL classroom was characterized by extrinsic motivations for reading.

Students in the CORI classroom were likely to describe themselves by saying:

- I like to read about new things.
- I enjoy a long, involved story or fiction book.
- If my friend is reading a good book, I will read it.
- If a book is interesting, I don't care how hard it is to read.
- I like being the only one who knows an answer in something we read.

Students in the BASAL classroom were likely to describe themselves by saying:

- I like to get lots of compliments for my reading.
- I always try to finish my reading on time.
- I am a good reader.

4. Does CORI improve students' cognitive strategies for reading?

The measures of cognitive strategies were applied to searching for information, expository comprehension, and narrative comprehension. As Figure 5 shows, a higher percentage of students attained higher levels of performance on the post-assessment than the pre-assessment for the three measures. These measures were embedded in the instructional assessments that were given as pre- and post-

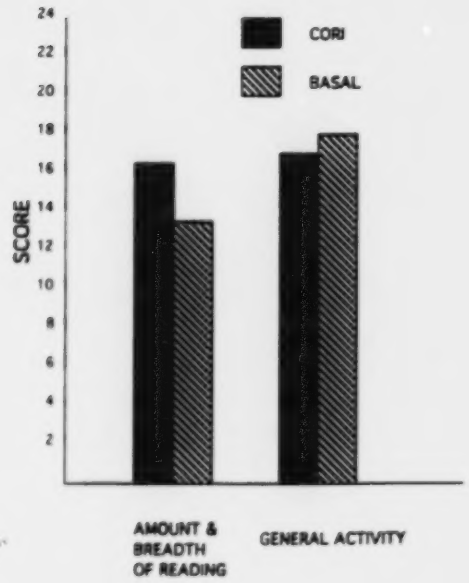

Figure 4. Amount and Breadth of Reading Activity in CORI and BASAL Classrooms.

assessments in September and December, 1992. Learning was examined by comparing students' performance in the pre- and post-assessments in a two-groups by seven-measures repeated measures analysis of variance.

Searching for information was significantly higher in the post-assessment than the pre-assessment, $F(1, 20) = 11.50$, $p < .01$. Students progressed from a median of 3 to a median of 4, indicating that they improved in the relevance of the texts they selected, the cogency of their reasons for choosing those selections, and the thoroughness of their written notes on their reading. Although it is traditional to report medians with non-parametric tests, we use the medians here in conjunction with analysis of variance to enable the reader to connect the numbers that represent levels of learning to the numbers in the scoring rubrics.

Comprehension of exposition was significantly higher in the post-assessment than the pre-assessment, $F(1, 20) = 14.31$, $p < .001$. Students moved from a median of 2 to a median of 3, showing that in the posttest they began to use both the text and the illustrations as resources for formulating an integrated answer to the questions.

Comprehension of narrative had a median of 2 at both time periods. The mean increased from 1.6 to 1.9, but this was not a statistically significant difference. The students were asked to give a personal response as well as a report of their perception of the character in the folktale and their recall of a portion of the plot. The students' personal responses were weighted heavily in our coding, and they were too idiosyncratic to show change over this brief period of the school year.

5. Does CORI increase students' ability to acquire conceptual knowledge?

The instructional assessment contained three opportunities for students to show their conceptual learning via a visual solution, a verbal solution and application/extension (see Figure 6). After searching their packets of information for two days, students were asked to draw their understanding of the concept of the phases of the moon or the concept of the cause of the tides on earth. This drawing was a measure of their capability to learn from texts and illustrations, rather than solely a measure of their background knowledge. The qualities of the drawings increased from a median of 3 to a

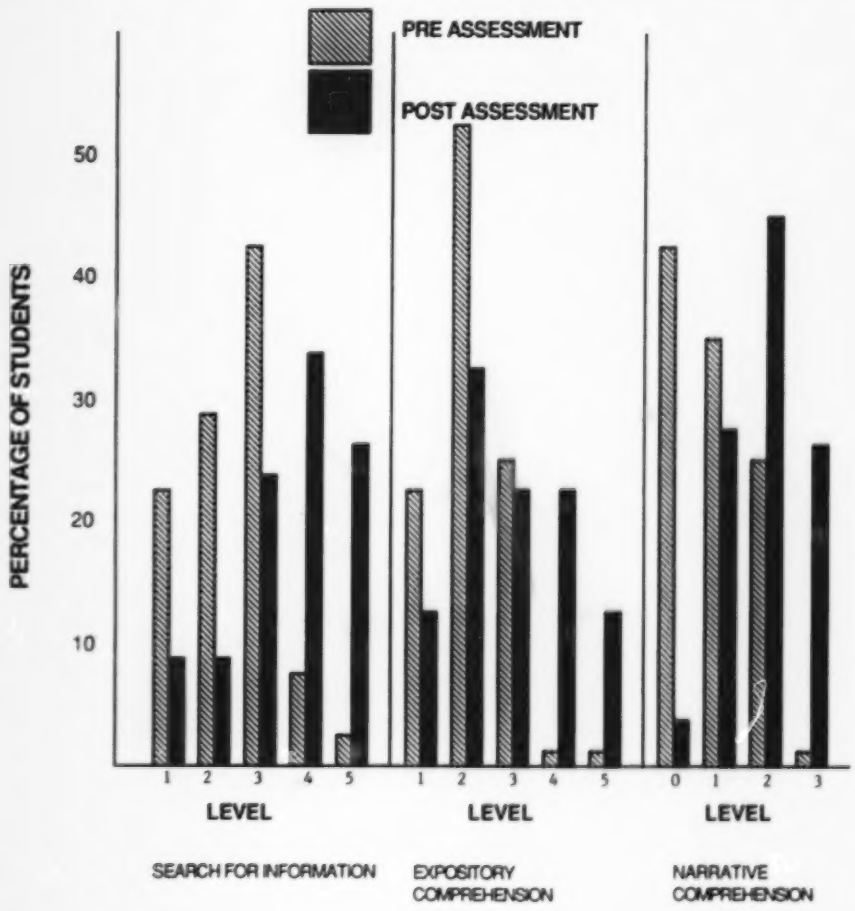

Figure 5. Differences in Pre- and Post-Assessment Performance On Search for Information, Expository Comprehension and Narrative Comprehension.

median of 4, which was statistically significant, $F(1, 19) = 6.18, p < .02$. The drawings improved from showing the objects (such as the moon, earth, or sun) in isolation, to showing the objects with an indication of relationships stated in vague form.

The verbal solution, a written explanation of the concept, was made after the drawings. Scores on the verbal solution increased from a median of 3 in the pre-assessment to a median of 4 in the post-assessment, which was statistically significant, $F(1, 19) = 12.10, p < .002$. Students improved from describing the objects in isolation to describing the objects with scientifically appropriate causal relationships, although the relationships were not highly detailed.

Transfer of conceptual knowledge is an important educational goal and a stringent test of the depth and flexibility of understanding.

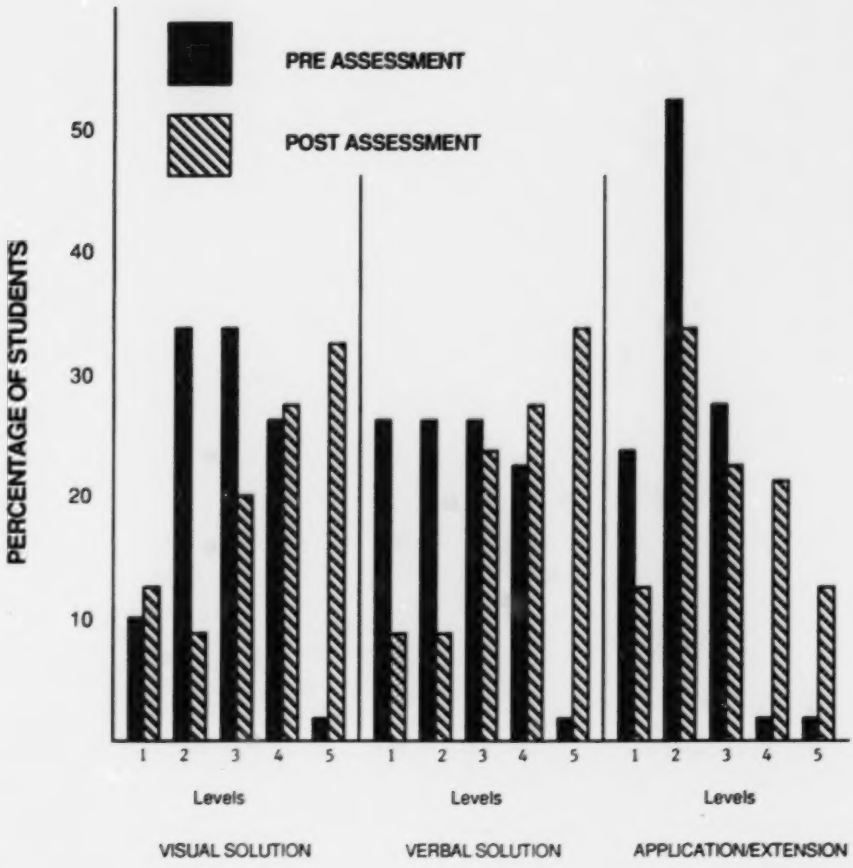

Figure 6. Conceptual Learning as Indicated by Drawing, Writing, and Problem Solving.

Transfer was shown by performance on the application/extension task, in which students used their conceptual understanding to solve a novel problem. Students' performance on the application task increased from a median of 2 to a median of 3, which was statistically significant, $F(1, 20) = 7.39$, $p < .01$. This increase indicates that students moved from representing some of the objects and none of the relationships in the pre-assessment to representing most of the objects and some of the relationships in a scientifically appropriate form in the post-assessment.

At the beginning of the instructional assessment, students were asked to write their understanding of a conceptual problem such as "How does the moon change phases?" This writing served as a measure of the knowledge that students brought to the assessment before learning within the assessment took place. Consequently, the measure reflects learning during the fall term rather than learning during the assess-

ment. Performance on the Problem Statement stage of the assessment increased from a median of 2 to a median of 4, which was statistically significant, $F(1, 18) = 9.00, p < .008$.

DISCUSSION

Findings

In this inquiry we created an approach to teaching that we label Concept-Oriented Reading Instruction (CORI). Fifth-grade students from a multicultural population who were taught science and reading with this approach in a year-long curriculum showed substantial growth in reading engagement. The notion of engagement emphasizes the fusion of *choosing* and *comprehending*. Students who experienced Concept-Oriented Reading Instruction reported choosing to read more frequently and widely than students in a basal-using classroom in the same school. These choices were driven by intrinsic motivations. Students in the CORI classroom reported more intrinsic motivations for reading, such as curiosity, and fewer extrinsic motivations for reading than did students in the BASAL classroom. Students who experienced the CORI approach gained substantially in the higher order cognitive strategies involved in searching for information, comprehending informative text, constructing conceptual knowledge, and transferring conceptual knowledge to solve novel problems.

Concept-Oriented Reading Instruction and Other Approaches

We believe that being an active reader is vital to children as students and to students as individuals emerging into the adult community. Reading widely and frequently yields new understanding about the world around us; it brings us new experiences through literature; and it helps us to effect the accomplishment of practical tasks. These benefits of reading accrue to both children and adults (Guthrie & Greaney, 1991; Mikulecky, 1991; Stanovich & Cunningham, 1993).

In this project we endeavored to design a classroom environment that supported children's development as active, interested readers. Our instructional framework was intentionally broad, reflecting our view of the complexity of learning in classrooms and the multiple roots of reading. Building an instructional framework to foster reading activity required us to coordinate many dimensions of learning and instruction.

Our instructional framework begins with student observations of the world surrounding them, because the real world is intrinsically interesting. To accommodate students' preferences, we combine the orientation to real-world concepts with student choices and self-direction. To base reading instruction on students' interests, we provide for extensive student choice of reading materials. Occasional choice that is recreational is valuable. But frequent, continuously evolving choice that is central to the curriculum is more consistently motivating. Enabling students to pursue and extend their interests through continuing selection of topics and materials is the heart of the motivating classroom context, according to a variety of researchers (Ames, 1992; Blumenfeld et al., 1991; Deci et al., 1991) including ourselves. As students find out what intrigues them and defines their sense of fascination,

they personalize their interests and develop an identification with the object of their learning. Our framework was initiated by guiding students in observing the real world and personalizing a portion of it for further learning.

When motivations such as intrinsic interests are aroused, students will learn and use cognitive strategies to pursue those interests (Nolen, 1988; Pintrich & DeGroot, 1990). Productive reading, in which students gain conceptual knowledge or aesthetic experience, requires the ability to perform such cognitive operations as recognizing words, monitoring comprehension, drawing inferences, and summarizing. These processes are not motivating in themselves; for example, students do not report great satisfaction in improving their inferencing ability. But these processes are mediators for the satisfaction of intrinsic motivations such as curiosity.

Because strategies are indispensable to productive reading, it is important to provide conditions that foster strategy learning. Our instructional framework provides for teacher modeling, coaching, guided practice, and feedback from the teacher and other students. Our strategy teaching builds on the approaches of direct explanation (Dole, Duffy, Roehler, & Pearson, 1991) and transactional strategy instruction (Pressley et al., 1992). Like Roehler (1992), we encourage teachers to "embrace the complexities of reading instruction" (p. 427) by helping students gain flexible use and awareness of cognitive strategies.

One difference between our framework and other strategy instruction approaches is that we are emphatic about placing strategies in a rich conceptual context. Strategy instruction is "situated"; strategies must be necessary and useful. A reading strategy is hard for students to learn, remember, and use, under any conditions. But when a strategy is taught in an intrinsically interesting, conceptually compelling context, students are motivated to learn it. The strategy is useful because it serves students' immediate and larger interests, and reading is not merely a cognitive exercise.

In this instructional framework, students learn personally interesting concepts about the world around them through the motivated use of cognitive strategies. This scenario for learning contains the assumption that something worth learning through reading is worth sharing. Accordingly, the framework includes communication of information to others as an explicit aim of instruction. Communicating to others takes two forms: peer-peer interaction and constructing a permanent expression of what has been learned. To learn concepts and reading strategies, students participate in small-group, peer-peer interactions. This approach is consistent with quantitative evidence that peer-led discussion of texts fosters development of higher order thinking about the text and about various interpretations of the text (Almasi, 1993). Shared cognition is a means to refine conceptual understanding and to fine-tune cognitive strategies.

Our formulation of peer-peer interaction is akin to cooperative learning (Slavin, 1990), with two differences. We place the social interaction in the context of learning concepts. The purpose of the peer interaction is the conceptual learning, not the social interaction itself. The reward for peer interaction is the new insight and the social process. We do not award points for successful group work because this external reward distracts students from the substantive content and enjoyment of

social exchange. Peer-peer interaction is coordinated with the observational and strategy instruction dimensions, rather than being an adjunct to or an enrichment for the curriculum.

A second form of communicating to others involves constructing a permanent expression of what students know. Students write reports about the interesting concept; the audience is specified as peers in the class, students at other grade levels, or another genuine audience. Students may also make dioramas and models or compose poetry or drama for an audience. Obtaining a response from the audience is necessary to close the communication loop. The report or the diorama can not be composed for the teacher, the shelf, or the closet, if it is to sustain the motivations for active reading. Communicating through writing and illustrating is a means for expressing what has been learned through active reading, and it is in itself a significant literacy action.

Coordinating the instructional dimensions of

- observe and personalize
- search and retrieve
- comprehend and integrate
- communicate to others
- peer-peer interaction

is one of the unique features of the concept-oriented approach to reading instruction. Although programs in science education that follow a constructionist perspective emphasize observational activity (Glynn, Yeaney, & Britton, 1991), those programs rarely include an emphasis on strategies of reading. In those programs, students are rarely led to pursue their curiosities through the use of books. CORI, in contrast, situates reading-strategy instruction within "hands-on" events to give context, purpose, and motivation for learning and using strategies. Strategies are important, but they are boring in isolation. When strategies are taught with student-selected topics and student-chosen books, motivations for learning about the topics of study may be transferred to reading itself as a process and a way of learning.

Effects of Programs on Students' Reading Engagement

Many reading programs attempt to increase students' motivation, interest, and enthusiasm. Stevenson and Carr (1993) reported a variety of programs that attempted to motivate students by integrating reading and writing with field trips. Covington (1992) described a "global gambit" (p. 170) in which teams of students ventured to save the planet Earth from greenhouse warming. Blumenfeld and her colleagues described a project-based approach that combined conceptual, strategic, and social experiences for students (Blumenfeld et al., 1991). Ames (1992) summarized research which suggests that classrooms that support intrinsically interesting tasks, student autonomy, and recognition of effort should increase students' mastery orientation. All these approaches promise to excite students and increase their motivation for learning, but the authors have not reported data to permit us to determine whether the programs actually do affect motivation.

It is sobering to examine empirical studies that attempt to discern whether programs such as these actually increase students' motivations. For example, Gamoran & Nystrand (1992)

found that a ninth-grade literature curriculum that attempted to increase involvement, commitment, and interest by emphasizing student-directed discourse did not necessarily lead students to "find the course interesting" or to "try hard." Roehler (1992) encouraged teachers to embrace the complexities of reading, which included emphasizing students' self-efficacy and enthusiasm for reading, but this instruction did not enhance students' self-reported motivations for learning.

In light of this prior research, we are encouraged by the preliminary results which suggest that CORI had positive effects on choosing to read and enhancing intrinsic motivations for reading. Nevertheless, further inquiry is needed to characterize reading engagement and how instruction can enhance it. Most of the measures of motivation used in studies to date, including ours, have not been tailored to the students' conceptual interests, to the observational context, or to the social milieu of the classroom. Future research that develops more "contextualized" theories and measurements of motivation is likely to yield stronger relationships between instructional interventions and motivational outcomes.

Author Notes. We thank the Principal of Calverton Elementary School and the Supervisor of Reading and the Supervisor of Science for Prince George's County, MD, for their support throughout the project. We are also grateful to the students who coded the instructional videotapes: Gail Bjerklie, John Kunz, Lois Groth, Leslie Miller, Eric Satlow, and Paula Sayag.

Correspondence concerning this report should be addressed to John T. Guthrie, National Reading Research Center, 2102 J. M. Patterson Building, University of Maryland, College Park, MD 20742.

REFERENCES

Adoni, H., & Shadmi, E. (1980). The portrait of the citizen as a young reader: The functions of books in the political socialization of youth in Israel. *Reading Research Quarterly, 16*(1), 121-137.

Almasi, J. F. (1993). *The nature of fourth graders' sociocognitive conflicts in peer-led and teacher-led discussions of literature.* Unpublished doctoral dissertation, University of Maryland College Park.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84*(3), 261-271.

Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading comprehension. In P. D. Pearson (Ed.), *Handbook of Reading Research* (Vol. 1, pp. 255-293). White Plains, NY: Longman.

Anderson, R. C., Wilson, P. T., & Fielding, L. G. (1988). Growth in reading and how children spend their time outside of school. *Reading Research Quarterly, 23*(3), 285-303.

Archambault, R. D. (Ed.) (1964). *John Dewey on Education.* Chicago: University of Chicago Press.

Au, K. H., & Mason, J. M. (1981). Social organizational factors in learning to read: The balance of rights hypothesis. *Reading Research Quarterly, 17*(1), 115-152.

Beach, R., & Hynds, S. (1991). Research on response to literature. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 453-489). White Plains, NY: Longman.

Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting, and learning. *Educational Psychologist, 26*(3 & 4), 369-398.

Covington, M. (1992). *Making the grade.* Cambridge: Cambridge University Press.

Csikszentmihalyi, M. (1978). Intrinsic rewards and emergent motivation. In M. Lepper & D. Green (Eds.), *The hidden costs of reward: New perspectives on the psychology of human motivation* (pp. 205-216). Hillsdale, NJ: Erlbaum.

Cunningham, A., & Stanovich, K. (1991). Tracking the unique effects of print exposure in children: Associations with vocabulary, general knowledge, and spelling. *Journal of Educational Psychology, 83*(2), 264-274.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychology, 26,* 325-346.

Dole, J. A., Duffy, G. G., Roehler, L. R., & Pearson, P. D. (1991). Moving from the old to the new: Research on reading comprehension instruction. *Review of Educational Research, 61*(2), 239-264.

Fillion, B. (1981). Reading as inquiry: An approach to literature learning. *English Journal, 1,* 39-45.

Foertsch, M. A. (1992). *Reading in and out of school: Factors influencing the literacy achievement of American students in grades 4, 8, and 12, in 1988 and 1990.* Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Frederiksen, J., & Collins, A. (1989). A systems approach to educational testing. *Educational Researcher, 18*(9), 27-33.

Gamoran, A., & Nystrand, M. (1992). Taking students seriously. In F. M. Newman (Ed.), *Student engagement and achievement in American secondary schools.* New York: Teachers College Press.

Gaskins, I., Guthrie, J. T., Satlow, E., Ostertag, F., Six, L., Byrne, J., & Conner, B. (in press). Integrating instruction of science and reading/writing processes: Goals, assessments, and teacher development. *Journal of Research in Science Teaching.*

Glynn, S. M., Yeaney, R. H., & Britton, B. K. (1991). A constructivist view of learning science. In S. M. Glynn, R. H. Yeaney, & B. K. Britton (Eds.), *The psychology of learning science.* Hillsdale, NJ: Erlbaum.

Gray, W. S., & Rogers, B. (1956). *Maturity in reading: Its nature and appraisal.* Chicago: University of Chicago Press.

Greaney, V., & Hegarty, M. (1987). Correlates of leisure-time reading. *Journal of Research in Reading, 10,* 3-20.

Guthrie, J. T., & Greaney, V. (1991). Literacy acts. In R. Barr, M. L. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of Reading Research* (Vol. 2, pp. 68-96). White Plains, NY: Longman.

Guthrie, J. T., Schafer, W. D., & Hutchinson, S. R. (1991). Relations of document literacy and prose literacy to occupational and societal characteristics of young black and white adults. *Reading Research Quarterly, 26*(1), 30-48.

Guthrie, J. T., Schafer, W., Wang, Y., & Afflerbach, P. (1993). *Influences of instruction on amount of reading: An empirical exploration of social, cognitive, and instructional indicators.* (Reading Research Report No. 3). Athens, GA: National Reading Research Center, Universities of Georgia and Maryland.

Hiebert, E. H., & Fisher, C. W. (1990, March). Whole language: Three themes for the future. *Educational Leadership,* pp. 62-64.

Holland, J. H., Holyoak, K. J., Nisbett, R. E., & Thagard, P. R. (1989). *Induction: Processes of inference, learning, and discovery.* Cambridge, MA: MIT Press.

Johnson, D. W., Johnson, R. T., Stanne, M. B., & Garibaldi, J. (1990). Impact of group processing on achievement in cooperative groups. *Journal of Social Psychology, 130*(4), 507-516.

LeCompte, M. D., & Preissle, J. (1993). *Ethnography and Qualitative Design in Educational Research. New York: Academic Press.*

Mikulecky, L. (1987). The status of literacy in our society. *Research in literacy: Merging perspectives, Thirty-sixth Yearbook of the National Reading Conference* (pp. 211-237). Chicago: National Reading Conference.

Morrow, L. M. (1992). The impact of a literature-based program on literacy achievement, use of literature, and attitudes of children from minority backgrounds. *Reading Research Quarterly, 27*, 250-275.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction, 5*(4), 269-287.

Paris, S., Wasik, B., & Turner, J. (1991). The development of strategic readers. In R. Barr, M. L. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 609-640). White Plains, NY: Longman.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40.

Pintrich, P., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in the classroom. In D. Schunk & J. Meece (Eds.), *Student perceptions in the classroom*. Hillsdale, NJ: Erlbaum.

Pressley, M., Schuder, T., Teachers in the Students Achieving Independent Learning Program, Bergman, J. L., & El-Dinary, P. B. (1992). A researcher/educator collaborative interview study of transactional comprehension strategies instruction. *Journal of Educational Psychology, 84*(2), 231-246.

Reif, F., & Allen, S. (1992). Cognition for interpreting scientific concepts: A study of acceleration. *Cognition and Instruction, 9*(1), 1-44.

Roehler, L. R. (1992). Embracing the instructional complexities of reading instruction. In M. Pressley, K. R. Harris, & J. T. Guthrie (Eds.), *Promoting academic competence and literacy in school*. New York: Academic Press.

Schunk, D. H., & Rice, J. M. (1987). Enhancing comprehension skills and self-efficacy with strategy value information. *Journal of Reading Behavior, 19*, 285-302.

Slavin, R. E. (1990). *Cooperative learning: Theory, research, and practice*. Englewood Cliffs, NJ: Prentice-Hall.

Stanovich, K. E., & Cunningham, A. E. (1993). Where does knowledge come from? Specific associations between print exposure and information acquisition. *Journal of Educational Psychology, 85*(2), 211-230

Stanovich, K. E., & West, R. F. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly, 24*(4), 402-433.

Stevenson, C., & Carr, J. F. (Eds.). (1993) *Integrated studies in the middle grades*. New York: Teachers College Press.

Wentzel, K. (1989). Adolescent classroom grades, standards for performance, and academic achievement: An interactionist perspective. *Journal of Educational Psychology, 81*, 131-142.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 265-310.

APPENDIX A

Descriptive Statements Related to Ten Motivational Constructs

The 10 constructs related to motivation illustrated with descriptive statements using students' language. Students rated these and similar statements on a 4-point scale ranging from "a lot like me" to "not at all like me."

1. Social: I talk to my friends about what I am reading.
2. Compliance: I always do my reading work exactly as the teacher wants it.
3. Self-Efficacy: I am good at reading.
4. Curiosity: If the teacher discusses something interesting, I might read more about it.
5. Aesthetic Enjoyment: I like stories with interesting characters.
6. Recognition: My parents give me gifts when I do well in reading.
7. Grades: Grades are a good way to see how well you are doing in reading.
8. Challenge: I like it when the questions in books make me think.
9. Competitiveness: I like getting more answers right than my friends.
10. Work avoidance: I don't like having to write about what I read.

APPENDIX B

Books Used in the CORI Project

Baker, D. (1989). *Living on the moon*. Zero Beach, FL: Rourke Enterprises, Inc.

Becklake, S. (1991). *Space: Stars, planets, and spacecraft*. London: Dorling Kindersly Ltd.

Bendick, J. (1991). *Moons and rings*. Brookfield, CT: Millbrook.

Brandly, F. M. (1987). *The moon seems to change* (rev. ed.). New York: Harper Collins.

Cameron, E. (1954). *The wonderful flight to the mushroom planet*. Boston: Little, Brown.

Frasier, D. (1991). *On the day you were born*. New York: Harcourt Brace Jovanovich.

Kelch, J. W. (1990). *Small worlds*. Englewood Cliffs, NJ: Simon & Schuster.

Lye, K. (1991). *The earth*. Brookefield, CT: Millbrook.

Mollel, T. W., & Morin, P. (1990). *The orphan boy*. New York: Clarion.

Monroe, J. G., & Williamson, R. A. (1987). *They dance in the sky*. Boston: Houghton Mifflin.

Nicholson, I. (1991). *The illustrated world of space*. New York: Simon & Schuster.

NRRC National
Reading Research
Center

318 Aderhold, University of Georgia, Athens, Georgia 30602-7125
2102 J. M. Patterson Building, University of Maryland, College Park, MD 20742

BEST COPY AVAILABLE